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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/577,914

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Florian Moll

A-9972

6884

20741

7590

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Welsh Flaxman & Gitler  
2000 Duke Street , Suite 100  
Alexandria, VA 22314

EXAMINER

POLYANSKY, ALEXANDER

ART UNIT

PAPER NUMBER

1735

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PAPER

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

<b>Office Action Summary</b>	<b>Application No.</b> 10/577,914	<b>Applicant(s)</b> MOLL ET AL.	
	<b>Examiner</b> Alexander Polyansky	<b>Art Unit</b> 1735	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 21 March 2011.
- 2a) ☒ This action is **FINAL**.                      2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1,3-11,15 and 16 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1, 3-11, and 15-16 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All    b) ☐ Some \*    c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- |   |   |
|---|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)         | 4) <input type="checkbox"/> Interview Summary (PTO-413)           |
| 2) <input type="checkbox"/> Notice of Draftperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____                                      |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)         | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date _____   | 6) <input type="checkbox"/> Other: _____                          |

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### **DETAILED ACTION**

Claims 1, 3-11, and 15-16 remain for examination. Claims 1 and 3-11 had been amended. Claims 15-16 are new.

#### ***Status of Previous Objections/Rejections***

The objection to the specification regarding arrangement has been withdrawn in view of the substitute specification that had been submitted May 1, 2006.

The objection of claims 5-8 and 10 has been withdrawn in view of the amendment filed March 21, 2011.

The 35 U.S.C. 112, second paragraph rejection of claims 1-11 has been withdrawn in view of the amendment filed March 21, 2011.

The 35 U.S.C. 102(b) rejection of claims 1, 2, 8, and 10 as being anticipated by Nishino JP 2000-017352 has been withdrawn in view of the amendment filed March 21, 2011.

All rejections featuring Nishino have been withdrawn.

#### ***Claim Rejections - 35 USC § 112***

The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

**Claims 8 and 9 are rejected under 35 U.S.C. 112, first paragraph**, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the

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relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention.

In claims 8 and 9, the amended term “approximately” is unsupported by the instant specification; therefore, it is new matter.

**Claims 8 and 9 are rejected under 35 U.S.C. 112, second paragraph**, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

In claim 8, lines 2 and 3; the recited “approximately” is relative. What is the range that is encompassed by the term "approximately"? For example, would 20 wt% meet the "approximately 15% by weight Si"?

***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

**Claims 1, 3-10, and 15-16 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hutmann DE 10135198 (also published under EP 1281459 and cited in the IDS) in view of Kondoh WO/03069001 (also published under US 20050089435 which will be used for ease of referencing) or, in the alternative, over Kondoh in view of Hutmann.**

**Regarding claim 1**, Hutmann teaches a method using thixo pressure die casting (thixomolding) process wherein at least two particulate materials of different compositions, in particular aluminum or magnesium alloys, are converted into the thixotropic state in a screw

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extruder by heating to a temperature between the solidus and liquidus temperature and shearing; and ejecting from a storage zone via a nozzle (title and abstract). Hutmann teaches that if magnesium is used as base material, silicon can be added as the alloying element (Hutmann par. 14). Because the disclosure of Hutmann teaches a thixomolding process in general terms,

**Hutmann does not specify the production of a  $Mg_2Si$  phase from the Mg and Si discussed above.**

Kondoh teaches a method in which Mg and Si powders (granulates) are mixed and molded comprising the heating and pressing steps in an inert gas atmosphere or in vacuum at an appropriate solid-phase temperature which is less than a melting point of Mg to generate fine  $Mg_2Si$  are dispersed in a matrix so that the material exhibits excellent strength, hardness, abrasion resistance and tempered opponent aggression (Kondoh pars. 6 and 20, and abstract).

It would be within purview of an ordinary artisan that combining the base Mg and alloying it with Si in the thixomolding method discussed in Hutmann would generate fine  $Mg_2Si$  dispersed in a matrix as taught in Kondoh with a reasonable expectation of success. Further, it would be obvious to one of ordinary skill in the art to be motivated in generating the fine  $Mg_2Si$  dispersed in a matrix as taught in Kondoh when using the thixomolding method of Hutmann so that the Mg material of Hutmann exhibits excellent strength, hardness, abrasion resistance and tempered opponent aggression (Kondoh pars. 6 and 20, and abstract).

Although Kondoh does not expressly teach “thixomolding”, because Kondoh's process molds Mg and Si in a thixo state (in a solid-phase temperature which is less than a melting point of Mg), the Mg and Si powders of Kondoh can be applied in Hutmann's thixomolding process to manufacture a  $Mg_2Si$  phase with expected success.

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Kondoh teaches the  $Mg_2Si$  phase is 3 or more parts by weight of the 100 parts by weight of Mg base (par. 39), which meets or, at least, overlaps the claimed " $Mg_2Si$  phase with a volumetric content of at least 2%". See MPEP 2144.05(I).

**In the alternative,**

Kondoh teaches a method in which Mg and Si powders (granulates) are mixed and molded comprising the heating and pressing steps in an inert gas atmosphere or in vacuum at an appropriate solid-phase temperature which is less than a melting point of Mg to generate fine  $Mg_2Si$  are dispersed in a matrix so that the material exhibits excellent strength, hardness, abrasion resistance and tempered opponent aggression (Kondoh pars. 6 and 20, and abstract). Kondoh teaches the  $Mg_2Si$  phase is 3 or more parts by weight of the 100 parts by weight of Mg base (par. 39), which meets or, at least, overlaps the claimed " $Mg_2Si$  phase with a volumetric content of at least 2%".

Although Kondoh does not expressly teach "thixomolding", because Kondoh's process molds Mg and Si in a thixo state (in a solid-phase temperature which is less than a melting point of Mg), it would necessarily follow that the step can be construed as thixomolding.

**Kondoh does not teach the shearing step.**

Hutmann teaches a method using thixo pressure die casting (thixomolding) process wherein at least two particulate materials of different compositions, magnesium alloys alloyed with Si (par. 14), are converted into the thixotropic state in a screw extruder by heating to a temperature between the solidus and liquidus temperature and shearing; and ejecting from a storage zone via a nozzle (Hutmann title and abstract).

The disclosure of Hutmann suggests that the conventional application of thixomolding process on Mg alloys includes shearing and it would be within purview of an ordinary artisan to incorporate the step of shearing in the thixomolding process of Kondoh with expected success.

Further, because the disclosure of Kondoh heats the Mg base to between the solidus and liquidus temperatures of Mg (Kondoh par. 6), the shearing step borrowed from Hutmann would accomplish a substantially similar purpose in Kondoh as that of Hutmann, because the thixomolding process of Hutmann also heats the Mg base metal to a temperature between the solidus and liquidus temperature (abstract). The final product of Kondoh does not have to be ejected as taught in Hutmann to meet the claimed method.

**Regarding claim 3**, the granulates of Si and Mg of Kondoh are processed jointly (*see above*).

**Regarding claims 4 and 16**, in Table 1, Kondoh shows that Si content determines the formed content of  $Mg_2Si$  metal matrix by weight (see columns 3 and 5), which would allow one to appreciate that the Si content in the metal matrix is directly proportional to the amount of Si added (Si granulate).

**Regarding claims 5 and 6**, Hutmann teaches the thixomolding produces a cast body which is further processed into parts (abstract and claims).

**Regarding claim 7**, Hutmann shows an apparatus with an ejection nozzle through which the metal matrix material is extruded.

**Regarding claim 8**, Kondoh teaches adding anywhere from 3 to 13.5 wt% of Si (Table 1), which is inside the claimed range.

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**Regarding claim 9**, Kondoh teaches the metal matrix is 3 wt% or more (*see above*), which meets and overlaps the 5% to 40% claimed.

**Regarding claim 10**, Kondoh teaches AZ91 Mg alloy (par. 55).

**Regarding claim 15**, the Examiner's position with respect to the amount of  $Mg_2Si$  crystallites and how it relates to Si content is as stated above.

With respect to the size of  $Mg_2Si$  crystallites and how it relates to the size of Si starting material, since Kondoh teaches several examples having differing sizes of Si starting material (58 microns in Example 1, 24 microns in Example 2, and 45 microns in Example 3), and since content of Si influences the content of  $Mg_2Si$  (*as discussed above*) it would be within purview of an ordinary artisan that the varying sizes of Si would generate  $Mg_2Si$  crystallites with varying sizes as claimed.

**Claim 11 is rejected under 35 U.S.C. 103(a) as being unpatentable over Hutmann in view of Kondoh or, in the alternative, over Kondoh in view of Hutmann as applied to claim 1 above, and further in view of Bredzs US 3,415,697.**

**Regarding claim 11**, neither Hutmann nor Kondoh specifies the step of reducing the heating rate due to the addition of a Si or a Si alloy granulate.

Bredzs teaches when mixing alloys of Mg and Si, i.e. Al-Mg and Al-Si, due to the high affinity of Mg for Si a highly exothermic reaction takes place to form  $Mg_2Si$  (Bredzs col. 3, lines 24-50). Bredzs further discloses that the heat of formation of  $Mg_2Si$  at room temperature is 19 Cal/mole (col. 3, lines 64-68), which is so extraordinarily high that it is capable of melting approximately 200 g of pure Al (pure Al having a melting temperature of 660°C).



It would be obvious to one of ordinary skill in the art to reduce the heating rate when the melt first forms of the semi-solid casting device (thixomolding device) of Hutmann or Kondoh because of the nature of the reaction of Mg with Si as described in Bredzs (col. 3, lines 24-50, and 64-68).

### ***Response to Arguments***

Applicant's arguments filed March 21, 2011 have been fully considered but they are not persuasive.

At page 7 of the Remarks, Applicants submit that Nishino does not disclose the step of thixomolding including the step of shearing to form at least one partially liquid melt.

***In response***, since Nishino has been withdrawn, all arguments with respect to Nishino are moot.

### ***Conclusion***

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Alexander Polyansky whose telephone number is (571)270-5904. The examiner can normally be reached on Monday-Friday, 8:00 a.m. EST - 5:00 p.m. EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Jessica L. Ward can be reached on 571-272-1223. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Alexander Polyansky/  
Examiner, Art Unit 1735

/JESSICA L. WARD/  
Supervisory Patent Examiner, Art Unit 1735